COCKCROFT/LIVERPOOL ACCELERATOR GROUP: STATUS AND OPTIONS

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Activities, Staff, Resources

ILC Polarised Positron Source and Robust Spin Transport	Ian Bailey
	Leo Jenner
	Lei Zang
	Larisa Malysheva
ILC Damping Rings	Kai Hock
	Maxim Korostelev
	Kosmas Panagiotidis
	Andy Wolski
Generic Beam Dynamics	Gabriele Bassi
	David Newton

Activities, Staff, Resources

ILC Polarised Positron Source and Robust Spin Transport	LCABD
	EuroTeV
	U. Liverpool PP Rolling Grant
	(Cockcroft Core Grant)
ILC Damping Rings	LCABD
Generic Beam Dynamics	Cockcroft Core Grant

The STFC Delivery Plan

- STFC operates national science “facilities” (including Rutherford and Daresbury Laboratories) and supports particle physics and astronomy through grants to universities.
- Delivery Plan (published 11 December 2007) states the programmes that STFC will support over the period FY08 – FY11.
- Comprehensive Spending Review settlement requires STFC to cut a number of existing programmes...

The STFC Delivery Plan

- "We will cease investment in the International Linear Collider. We do not see a practicable path towards the realisation of this facility as currently conceived on a reasonable timescale."
- The Delivery Plan outlines high-level policy. The detailed implications are important, but are not addressed – there are many unanswered questions:
  - What happens to university (LCABD) grants, recently announced for a three-year period?
  - To what extent can generic "linear collider" R&D be continued?

The PPARC Roadmap

- The PPARC Roadmap was built around 9 “key science questions”:
  - What is the universe made of and how does it evolve?
  - What is the origin of mass?
  - Are we alone in the universe?
  - Why is there more matter than antimatter?
  - How do galaxies, stars and planets form and evolve?
  - Is there a unified theory of all particle interactions?
  - What are the laws of physics in extreme conditions?
  - How does the Sun affect the Earth?
  - What are the origins and properties of the energetic particles reaching the Earth?

The STFC Delivery Plan

- The Delivery Plan lists 12 “Big Science questions”:
  - Why is there a Universe?
  - How did galaxies form?
  - Was there ever life on Mars?
  - How do planetary systems evolve?
  - How are the chemical elements created?
  - How does our climate work?
  - How can we create new materials to store energy?
  - How can we meet mankind’s need for abundant clean energy?
  - How can we design smart materials?
  - How do cells work?
  - How do degenerative diseases develop?
  - How can we design better treatments for cancer?

Accelerators in the Delivery Plan

- Accelerators and accelerator-based science are mentioned explicitly throughout the Delivery Plan...
- Particle Physics:
  - "Our highest priority will be to exploit the LHC."
  - "We will cease investment in the International Linear Collider."
  - "A neutrino factory...will fully uncover the neutrino's properties. We will decide through the programmatic review our strategy for further investment in this area."

Accelerators in the Delivery Plan

- Nuclear Physics:
  - “The first accelerators capable of producing beams of unstable nuclei are now becoming available...we will focus our investment in nuclear physics on the highest priority programmes.”

Accelerators in the Delivery Plan

- Light Sources:
  - “In supporting DIAMOND…we will work with our partners to ensure that the facility is operated as cost-effectively as possible…”
  - “We are considering, with our partners, an upgrade programme over the next 7 years to refurbish the [ESRF] accelerator complex…”
  - “The UK could take advantage of its substantial expertise and capabilities in accelerators and lasers to develop a new proposal for a next generation light source.”
  - “The UK will participate in the European XFEL.”
  - “We will run down the SRS as planned, with a closure date of 31 December 2008.”

Accelerators in the Delivery Plan

- Neutron Scattering:
  - “ISIS Target Station 2…will keep the UK at the forefront of neutron research.”
  - “On a fifteen-year timescale the UK research community will require access to a new, competitive neutron facility. We will over the CSR period explore the options for future investment.”

Daresbury in the Delivery Plan

- “STFC is uniquely placed to facilitate knowledge exchange and economic impact to the benefit of the UK, building on…the Science and Innovation Campuses at Harwell and Daresbury, which can act as focal points for collaboration and knowledge exchange with industry and academic researchers…”
- “The Harwell and Daresbury Science and Innovation Campuses form the most innovative and ambitious aspect of our KE strategy and will be recognised as internationally leading centres of excellence for science and innovation.”

Daresbury in the Delivery Plan

- “In the first year of the CSR period, we will…explore a range of options for Daresbury SIC, including a Joint Venture model.”
- “In the case of the Daresbury Campus our focus will be on creating a national technological capability in the areas of computational science and accelerator and detector R&D for next generation facilities.”

The STFC Delivery Plan

- The STFC Delivery Plan indicates a major shift away from support for high energy physics.
  - Exploitation of LHC is the only real commitment.
  - Support for ILC will cease.
  - No decision on whether or not to support neutrino experiments.
  - No mention of other projects, e.g. CLIC, SuperB...
- Unless something dramatic happens, the UK HEP community will have to undergo major readjustment.

Implications for Liverpool/CI

- There may be a chance of continuing linear collider R&D at some (low) level, but the original plans for the ILC engineering design phase will almost certainly not go ahead.
  - The US ILC programme is also facing severe cuts.
- The Cockcroft Core Grant is relatively secure.
- We should consider how to develop a balanced programme with good prospects in the longer term...

Implications for Liverpool/CI

- A healthy programme will:
  - maintain a balance between “generic” R&D and “project-specific” R&D;
  - promote the development of core skills;
  - allow for scientific innovation;
  - provide an appropriate degree of focus;
  - facilitate collaboration with other groups (locally, nationally and internationally);
  - provide good opportunities for funding and growth.

Implications for Liverpool/CI

- There are a number of projects, aside from ILC, that may offer opportunities for us...
- ...light sources and neutron spallation sources
  - UK “next generation” light source; (Euro XFEL?)...
- ...accelerators for high energy physics
  - CLIC; LHC upgrades; LHeC; neutrino factory; SuperB...
- ...accelerators for nuclear physics
  - FAIR
- ...accelerator R&D projects
  - ERLP; EMMA...

Implications for Liverpool/CI

- What is the right balance between generic studies and project-specific R&D?
- Which projects provide the best opportunities for us to develop a healthy programme?
- How many projects should we work on, and how should we spread our resources?